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Hyperspectrally-resolved surface emissivity derived under optically thin clouds

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Surface spectral emissivity derived from current and future satellites can and will reveal critical information about the Earth's ecosystem and land surface type properties, which can be utilized as a means of long-term monitoring of global environment and climate change. Hyperspectrally-resolved surface emissivities are derived with an algorithm utilizes a combined fast radiative transfer model (RTM) with a molecular RTM and a cloud RTM accounting for both atmospheric absorption and cloud absorption/scattering. Clouds are automatically detected and cloud microphysical parameters are retrieved; and emissivity is retrieved under clear and optically thin cloud conditions. This technique separates surface emissivity from skin temperature by representing the emissivity spectrum with eigenvectors derived from a laboratory measured emissivity database; in other words, using the constraint as a means for the emissivity to vary smoothly across atmospheric absorption lines. Here we present the emissivity derived under optically thin clouds in comparison with that under clear conditions.